

RADIOACTIVE MATERIALS TRANSPORT GUIDELINES

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8-1. INTRODUCTION.

This guide is written to assist the users of TACOM-RI equipment in understanding the transportation requirements of the Code of Federal Regulations (CFR). Specifically, it covers TACOM-RI radioactive commodities that are classified as "excepted package-instrument or articles."

8-2. REGULATORY AUTHORITY.

Throughout this summary, frequent references are made to the CFR sections for your convenience. If you are a Radiation Safety Officer (RSO) or Hazmat employee, (see definition in para. 8-4 of this chapter) you will need to become familiar with these regulations. Your safety office should be able to provide you with copies. For the purposes of this guide, personnel working in shipping and receiving, and the various RSOs are considered Hazmat Employees. Therefore, these people must meet the training requirements found in 49 CFR 172, Subpart H.

The regulations covered in this section are summarized in Figure 2 and include:

Title 10 CFR Part 20.

Title 10 CFR Part 71 (refers to 49 CFR).

Title 49 CFR Parts 171-177 (predominately Part 173).

Note: If there is a conflict between this guide and the CFRs, the CFRs are the controlling authority.

8-3. DEFINITIONS.

Class 7 (radioactive) material (49 CFR 173.403). (See the definition of radioactive material below).

Combination packaging (49CFR171.8). Means a combination of packaging, for transport purposes, consisting of one or more inner packagings secured in a non-bulk outer packaging. It does not include a composite packaging.

Excepted package (49 CFR 173.403). Means a package together with its excepted Class 7 (radioactive) materials.

Instruments and articles (49 CFR 173.403). Means any manufactured instrument and article such as an instrument, clock, electronic tube or apparatus, or similar instrument and article having Class 7 (radioactive) material as a component part. An excepted package of instruments and articles must conform to the requirements of 49 CFR 173.424.

Limited quantity of Class 7 (radioactive) material (49 CFR 173.403). Means a quantity of Class 7 (radioactive) material not exceeding the materials package limits specified in 49 CFR 173.425 and conforming with requirements specified in 49 CFR 173.421.

Hazardous material (49 CFR 171.8). Means a substance or material, which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce.

Hazmat Employee (49 CFR 171.8). Briefly stated, a hazmat employee is anyone who directly affects hazardous materials transportation safety.

Non-fixed radioactive contamination (49 CFR 173.403). Means radioactive contamination that can be readily removed from a surface by wiping with an absorbent material as specified in 49 CFR 173.443.

Package (49 CFR 173.403). Means, for Class 7 (radioactive) materials, the packaging together with its radioactive contents as presented for transport.

Radioactive material (49 CFR 173.403). Means any material having a specific activity greater than 70 Bq per gram (0.002 microcurie per gram).

8-4. OVERVIEW OF EXCEPTED PACKAGES REGULATIONS.

In Department of Transportation (DOT) terminology, "excepted packages" means "excepted" or an exception from the many requirements of 49 CFR. Hence the term "excepted package." An excepted package greatly simplifies the requirements for shipping TACOM-RI licensed commodities. If you consult the 49 CFR table of contents, you'll see the number of regulations eliminated by being "excepted". However, there are still requirements to be met. Excepted packages of Instruments and Articles are subject to 49 CFR 173.424 as summarized in the following:

- a. General Design Requirements (49 CFR 173.424(a)). Each package must meet the general design requirements of 49 CFR 173.410 and by reference 173.24, 173.24a, and 173.24b.
- b. Quantity Limits (49 CFR 173.424(b), (c)). The quantity of radioactive material in *each instrument or article*, and the total quantity packaged in the *excepted package* must not exceed the relevant limit listed under "Instruments and Articles in Table 8-1 below."

Table 8-1.
Activity Limits for Instruments, and Articles
(from Table 7 of 49 CFR 173.425)

Nature of Contents	"Instruments & Articles"		"Limited Quantity" Package Limits TBq (Curie)
	Limits of Each Instrument or Article TBq (Curie)	Package Limits TBq (Curie)	
Solids: Special form AM-241	0.02 (0.541)	2 (54.1)	0.002 (0.0541)
Normal form NI-63 TH-232	0.3 (8.11) infinity	30 (811) infinity	0.03 (0.811) infinity
Gases: Tritium H-3	0.8 (21.6)	8 (216)	0.8 (21.6)

Tbq: Terabecquerel or 1×10^{12} Becquerel

- c. Radiation Levels.
 - (1) Instrument or Articles (49 CFR 173.424(d)). TACOM-RI commodities are well below the radiation levels of 0.1 mSv/hour (10 mrem/hour) at 10 cm (4 inches).
 - (2) Package Surfaces (49 CFR 173.424(e)). Intact TACOM-RI commodities are well below the radiation levels of the 0.005 mSv/hour (0.5 mrem/hour).
- d. Surface Contamination Limits (49 CFR 173.424(f)). The level of non-fixed (removable) radioactive contamination on the external surfaces of each package offered for transport must be kept as low as reasonably achievable (ALARA-10 CFR 20.1101(b)). Per regulation, the level of removable radioactive contamination may not exceed the limits set forth in Table 8-2 below.

Table 8-2.
Non-Fixed External Radioactive Contamination - Wipe Limits
(from Table 11 of 49 CFR 173.443)

Contaminant	Maximum permissible limits		
	Bq/ cm ²	Micro- Curie/ cm ²	DPM/cm ²
Beta, gamma and low toxicity alpha emitters (H-3, Ni-63, TH-232)	0.4	1x10 ⁻⁵	22
All other alpha emitting radionuclides (Am-241)	0.04	1x10 ⁻⁶	2.2

NOTE: Wipes are to be taken of a 300 cm² area vs the standard 100 cm² area.

- e. Certification Documents (49 CFR 173.424(h)). An excepted package of instrument and articles must be certified as being acceptable for transportation by having a notice enclosed in or on the package, included with the packing list, or otherwise forwarded with the package. (It is best to fasten the notice on the outside of the package so it is visible to the carrier and receiver.) This notice must include the name of the consignor or consignee and the following statement:

"This package conforms to the conditions and limitations specified in 49 CFR 173.424 for radioactive material, excepted package-instruments or articles, UN2910."

- f. Figure 2 at the end of Section VIII provides the above regulations in a checklist format. Users are encouraged to refer to the checklist as needed to assure regulatory compliance.

8-5. SURVEY PROCEDURES PRIOR TO SHIPMENT.

- a. 49 CFR 173.443(a) specifies that a wipe test may not exceed the limits of Table 2 at any time during transport and must be determined by either:
- (1) Taking a 300 cm² wipe survey and measuring the activity on the wipe material (see 173.443(a) (1)); or
 - (2) Using other methods of assessment of equal or greater efficiency (see 49 CFR 173.443(a)(2)).

- b. Alternatively, a wipe tests can be taken on each item. In this case you must use new packaging material to ensure the package is free from contamination and document the test results prior to shipping.
- c. The test results must be received and reviewed before the shipment is authorized to leave. Include documentation of wipe tests in the shipping paperwork.
- d. For chemical items liked the Chemical Agent Alarm (M8A1), Chemical Agent Monitor (CAM), or Chemical Agent Detector Unit (M88) which require annual leak tests, if these items have a valid leak test within the past year and new packaging material is used, this is sufficient to ensure cleanliness. Include documentation of leak tests in the shipping paperwork.
- e. Preparation of tritium devices should include:
 - (1) Visually inspect and perform an illumination test on each article or device prior to packaging.
 - (2) Take a wipe test of the external surfaces of the shipping package. Alternatively, wipe test each individual item and use new packaging material.
 - (3) Have the wipe samples analyzed and ensure that the results are within acceptable limits of Table 2. Include documentation of wipe tests in the shipping paperwork.

8-6. RECEIVING AND OPENING PACKAGES.

The following monitoring procedures for receiving and opening packages are from Title 10 CFR 20.1906 paragraphs (b)(3), (c) and (e).

- a. Monitor all packages known to contain radioactive material for radioactive contamination and radiation levels if there is evidence of degradation of package integrity, such as packages that are crushed, wet, or damaged.
- b. Perform this monitoring as soon as practical after receipt of the package, but not later than three (3) hours after the package is received if it is received during normal working hours. If it is received after working hours, monitor package not later than three hours from the beginning of the next working day.
- c. Every RSO shall establish, maintain, and retain written procedures for safely opening packages in which radioactive material is received; and ensure that the procedures are followed and that due consideration is given to special instructions for the type of package being opened.

8-7. INCIDENT NOTIFICATION.

For any required regulatory notification involving a TACOM-RI commodity, contact the TACOM-RI License Staff **immediately** following the incident. The incident notification requirements are summarized below.

- a. The requirements of 10 CFR 20.1906(d) demand an **immediate** notification of the final delivery carrier and the NRC when removable contamination exceeds the limits of 49 CFR 173.443 (table 2 above).

Note that normally the licensee notifies the NRC. It is not recommended that you notify the NRC directly.

- b. The requirements of 49 CFR 171.15 (reference 173.422(b)) demand that the Department of Transportation (DOT) be notified as early as possible if an incident in which fire, breakage, spillage, or suspected radioactive contamination occurs during the course of transportation (including loading, unloading or temporary storage). The notice shall be given to the DOT by calling (800) 424-8802. Shipments involving aircraft will be given to the Centers for Disease Control at (800) 232-0124. Each notice must include

- (1) Name of reporter.
- (2) Name and address of carrier represented by reporter.
- (3) Phone number where reporter can be contacted.
- (4) Date, time, and location of incident.
- (5) The extent of injuries, if any.
- (6) Classification, name, and quantity of hazardous materials involved, if such information is available.
- (7) Type of incident and nature of hazardous material involvement and whether a continuing danger to life exists at the scene.

- c. Written Report. Each carrier making a report under this 49 CFR 171.15 shall also make a written report within 30 days of the incident as required by 49 CFR 171.16.
- d. Additional requirements. Sections 174.750, 175.45, 175.700 (b), 176.710, and 177.861 of 49 CFR impose additional requirements on the carrier, the consignee, and indirectly, the license holder. If a situation should arise which demands notification pursuant to these regulations, consult the referenced section of the CFR for the specific requirement(s).

- (1) Rail, Aircraft, Highway (49 CFR 174.750 (a), 175.700 (b), and 177.861 (a)). The carrier shall also notify the shipper at the earliest practicable moment if an incident in which fire, breakage, spillage, or suspected radioactive contamination occurs during the course of transportation (including loading, unloading or temporary storage).
- (2) Aircraft, (49 CFR 175.45(a)(2)). Each operator who transports hazardous materials shall report to the nearest FAA Civil Aviation Security Office by telephone at the earliest practicable moment following any incident in which fire, breakage, spillage, or suspected radioactive contamination occurs during the course of transportation (including loading, unloading or temporary storage).

8-8. STATUS OF FORCES AGREEMENTS (SOFA).

Shipment within foreign countries or between the US and foreign countries will require compliance with other regulations (IATA, ADR, etc.). The regulatory requirements governing the control and movement of radioactive commodities DO NOT apply outside the borders of the United States. If a host country has not adopted the DOD or DA doctrine, the management of radioactive commodities shall be in accordance with an approved Status of Forces Agreement (SOFA).

8-9. SECURITY ISSUES.

Whether the transportation is considered a shipment or not, security of the licensed radioactive material during the course of transportation (including loading, unloading or temporary storage) is required by 10 CFR Part 20, Subpart I. For radioactive equipment carried on the side of artillery and tanks, special care is required. Fire control devices on artillery must be removed and placed in the Basic Issue Item (BII) box and locked.